(19)日本国特許庁（ＪＰ）　(12) **公開特許公報（Ａ）**　(11)特許出願公開番号
特開2000－67139
（P2000－67139A）
(43)公開日　平成12年３月３日(2000.3.3)

(51)Int.Cl.⁷	識別記号	Ｆ Ｉ	テーマコード（参考）
Ｇ０６Ｆ　19/00		Ｇ０６Ｆ　15/42	Ｄ Ｈ

審査請求　未請求　請求項の数３　ＯＬ　（全 ７ 頁）

(21)出願番号　特願平10－238078

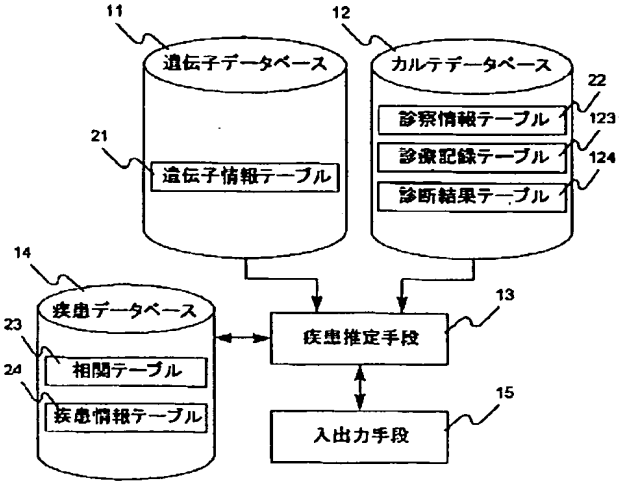
(22)出願日　平成10年８月25日(1998.8.25)

(71)出願人　000005108
株式会社日立製作所
東京都千代田区神田駿河台四丁目６番地
(72)発明者　佐々木　元
東京都国分寺市東恋ケ窪一丁目280番地
株式会社日立製作所中央研究所内
(72)発明者　松尾　仁司
東京都国分寺市東恋ケ窪一丁目280番地
株式会社日立製作所中央研究所内
(72)発明者　入江　亮太郎
東京都国分寺市東恋ケ窪一丁目280番地
株式会社日立製作所中央研究所内
(74)代理人　100068504
弁理士　小川　勝男

(54)【発明の名称】　電子カルテシステム

(57)【要約】
【課題】　患者の遺伝子情報、患者の診察情報から、患者が現在発症中か将来発症する可能性の疾患を推定する電子カルテシステムを提供する。
【解決手段】　遺伝子データベース１１とカルテデータベース１２に格納されている情報を疾患推定手段１３が読み出し、遺伝子情報及び診察情報と疾患との相関を格納した相関テーブル２３を検索するして、発症可能性の高い疾患を抽出し、入出力手段１５に表示する。蓄積された情報をもとに、疾患推定手段１３が新たな相関関係を抽出し、相関テーブル２３に追加して、以降の診療に利用する。
【効果】　医師の診断での意思決定を支援し、疾患の早期発見、早期治療を可能にする。

図１



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【特許請求の範囲】

【請求項１】患者の遺伝子情報を格納した遺伝子データベースと、前記患者の診察情報を格納したカルテデータベースと、前記遺伝子情報及び前記診察情報と疾患との相関関係と疾患情報とを格納した疾患データベースと、前記遺伝子データベースと前記カルテデータベースの両方に格納された情報をもとに、前記疾患データベースを検索することにより、前記患者が現在発症しているか将来発症する可能性の高い疾患を推定する疾患推定手段と、該疾患推定手段により推定された疾患と前記疾患情報を出力する出力手段を有することを特徴とする電子カルテシステム。

【請求項２】請求項１の電子カルテシステムに於いて、前記遺伝子データベースと前記カルテデータベースに蓄積した情報の中から、前記疾患推定手段が、医師の診断結果と、前記患者の前記遺伝子情報及び前記診察情報の組との新たな相関を抽出し、前記疾患データベースの相関テーブルに格納した情報を更新することを特徴とする電子カルテシステム。

【請求項３】請求項１又は請求項２の電子カルテシステムに於いて、前記カルテデータベースに格納されている前記診察情報と、前記疾患推定手段が推定した前記疾患と、前記疾患データベースに格納されている前記疾患の前記疾患情報とを、前記出力手段を用いて表示することを特徴とする電子カルテシステム。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、医師が医療行為に利用する電子カルテシステムに関し、特に患者の遺伝子情報と診察情報の両方に基づき可能性の高い疾患を推定して提示する電子カルテシステムに関する。

【０００２】

【従来の技術】医療に於ける従来の診療では、患者情報として問診結果、検査結果等の情報を参照し、診断に役立てている。診断を下すためには、検査結果や触診や聴診等による患者の現状だけではなく、診察を受けるに至るまでの患者の背景も、非常に重要な情報として判断材料に用いられる。患者の背景には、生活習慣等の後天的要因と、体質や遺伝等の先天的要因があり、両者とも重要である。後天的要因に関する情報は、主として問診により収集され、先天的要因に関する情報は、主として患者の両親や兄弟等の家族歴が聴聞された上で記録される。一方、遺伝子研究の進歩に伴い、特定の病気に関しては、発症に関与する遺伝子が解明され、発症前診断が可能となった。遺伝子情報から発生前診断をすることが可能な疾患は、今後ますます増加することが予測される。（特集「日常診療を変える遺伝子研究」、日経メディカル、１９９７年８月号、ｐｐ．６０～７１）

【０００３】

【発明が解決しようとする課題】診療の現場に於いて、

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検査結果や触診や聴診等による患者の現状や、問診等による生活習慣等後天的要因に関する情報は、比較的詳細に収集される。しかし、従来の診療では、患者の先天的要因に関する情報は、家族歴程度しか収集されていなかった。家族歴とは、患者の両親や兄弟等数名の家族の構成と、健在か否か、大きな病気はあるか否か、死亡している場合は死亡年齢と死因等を患者から聴聞して記録したものである。従って、家族歴は情報量が少ない上に、患者の記憶に頼っているため情報の信頼性も低い。しかし、先天的要因の情報は、家族歴以外では、発達の経過や身体所見、採血の所見の一部等から推測するに留まっており、先天的要因の重要性と比較すれば、量も質も共に不十分な情報であった。

【０００４】一方、遺伝子診断に関しては、臨床で実際に診断が行なわれているのは、単独の遺伝子の異常が原因で発症するような特定の遺伝病に限定されていた。遺伝病以外の多くの疾患は、遺伝による先天的要因と、生活習慣や環境等の後天的要因との組み合わせによって発症するが、従来の先天的要因の情報のみを利用する遺伝子診断のアプローチでは診断及び発症予測が困難であった。

【０００５】本発明の目的は、患者の遺伝子情報と、患者の診察情報の両方をもとに、患者が現在発症しているか将来発症する可能性の高い疾患を推定する電子カルテシステムを提供することにある。

【０００６】

【課題を解決するための手段】本発明の電子カルテシステムは、患者の遺伝子情報を格納した遺伝子データベースと、患者の主訴や既往歴や生活習慣や検査結果等の診察情報、診療記録、診断結果等を格納したカルテデータベースと、遺伝子情報及び診察情報と疾患との相関関係と疾患情報とを格納した疾患データベースと、遺伝子データベースとカルテデータベースの両方に格納された情報をもとに、疾患データベースを検索して、患者が現在発症しているか将来発症する可能性の高い疾患を推定する疾患推定手段と、疾患推定手段により推定された疾患と疾患情報を出力して医師に提示する出力手段を有する。また、遺伝子データベースとカルテデータベースに蓄積した情報の中から、疾患推定手段が、医師の診断結果と、患者の遺伝子情報及び診察情報の組との新たな相関を抽出し、疾患データベースの相関テーブルに格納した情報を更新することによって事後の診療に利用する。更に、カルテデータベースに格納されている診察情報、診療記録、診断結果等と、疾患推定手段が推定した疾患と、疾患データベースに格納されている疾患の疾患情報とを、出力手段を用いて一画面上で同時に、又は切替えて表示する。以上の構成により、先天的要因に関する患者遺伝子情報と、後天的要因及び現状に関する診察情報の両方に基づいて、的確な診断及び発症予測を行なうことが可能となる。

【０００７】
【発明の実施の形態】図１は、本発明の実施例の電子カルテシステムの構成例を示す図である。本実施例の電子カルテシステムは、患者の遺伝子情報を格納した遺伝子データベース１１と、患者の診察情報、診療記録、診断結果等を格納したカルテデータベース１２と、遺伝子情報、診察情報と疾患との相関関係と疾患情報とを格納した疾患データベース１４と、疾患推定手段１３と、入出力手段１５とを具備し、遺伝子データベース１１とカルテデータベース１２の両方に格納された情報をもとに疾患推定手段１３が疾患データベース１４を検索し、患者が現在発症しているか将来発症する可能性の高い疾患を推定し、推定疾患と疾患情報を入出力手段１５から出力する。以下、疾患を推定する処理の例を図２から図５を用いて説明する。
【０００８】先ず、遺伝子データベース１１及びカルテデータベース１２及び疾患データベース１４へ必要な情報を格納する形式の例を説明する。
【０００９】図２は、本発明の実施例でのデータ格納形式の例を示す図である。
【００１０】第１に、遺伝子データベース１１には、患者の遺伝子に関する情報を、図２（ａ）に示す遺伝子情報テーブル２１の形で格納する。遺伝子情報テーブル２１には、患者ＩＤ２１１、遺伝子ＩＤ２１２、遺伝子名２１３、遺伝子変異２１４等を格納する。図２の例では変異の有無を１と０の数値で表現しているが、変異の種類を記号で格納しても良い。また、遺伝子名毎に格納するのではなく、遺伝子検査の種類と検査結果との組として格納しても良い。
【００１１】第２に、カルテデータベース１２には、主訴や既往歴や生活習慣や検査結果等の診察情報を、図２（ｂ）に示す診察情報テーブル２２の形で格納する。診察情報テーブル２２には、患者ＩＤ２２１、項目ＩＤ２２２、項目名２２３、結果値２２４等を格納する。図２の例では問診の結果を０から１までの実数に正規化して表現しているが、予め定義した英数字や記号等で表現しても良い。また、生化学検査の結果等は検査結果の数値をそのまま格納しても良い。
【００１２】第３に、患者の遺伝子情報や診察情報の結果値と、発症する可能性の高い疾患との相関関係は、図２（ｃ）に示す相関テーブル２３の形で、疾患データベース１４に格納する。相関テーブル２３には、相関ＩＤ２３１、遺伝子情報及び診察情報と疾患との相関を表す関係式２３２、関係式２３２が成立する可能性を表す危険率２３３、関係式２３２が成立した事例の数を表す事例数２３４等を格納する。関係式２３２は、理論的又は統計的に立証されている相関関係を格納しても良いし、後述する方法により蓄積データの中から抽出した相関関係でも良い。
【００１３】図２の例では、関係式２３２がｉｆ－ｔｈｅｎ型の条件式で記述されているが、危険率を解とする計算式で記述しても良い。また、図２の例では危険率を、統計的に同性同年齢の健常人と比較した発症確立の高さを倍率で示しているが、発症確率自体をパーセントで示しても良い。
【００１４】第４に、疾患自体に関する情報を、図２（ｄ）に示す疾患テーブル２４の形で、疾患データベース１４に格納する。疾患情報テーブル２４には、疾患ＩＤ２４１、疾患名２４２、診断の指針２４３、必要な検査２４４、合併症２４５、治療法２４６等を格納する。疾患情報テーブルに格納された情報は、医師が確認したり治療方針をたてたりするのに利用するものとして用意されるが、２４３～２４６の情報は必ずしも具備していなくとも良い。なお、図１では遺伝子データベース１１とカルテデータベース１２と疾患データベース１４は、それぞれ別個に表記されているが、情報を図１に示した形態で管理しても、単一のデータベースで一括して管理しても、ネットワークに接続された複数のデータベースで分散して管理しても良い。また、文献（遺伝子医学、Ｖｏｌ．２、Ｎｏ．１、ｐｐ．１３５～１４５）に紹介されているような国際遺伝子データベースや各国研究機関の疾患遺伝子データベースと連携させる形で運用しても良い。
【００１５】図３は、本実施例での通常の診察時の処理の流れを示す図である。診察開始の際には、先ず、疾患推定手段１３が患者の遺伝子データベース１１、及びカルテデータベース１２から情報を読み込み（読込手順３１）、疾患データベース１４に於ける相関テーブル２３の関係式２３２が成立するものを抽出する（疾患推定手順３２）。また抽出された関係式が示す疾患に関する疾患情報も疾患データベース１４の疾患情報テーブル２４から読み出される。以上の処理で揃った情報、即ち患者の遺伝子情報、診察情報、推定された疾患の疾患情報を、入出力手段１５に表示し、診療記録の記入ができる状態にする（入出力手順３３）。医師による診療記録の入力を受け入れながら、診察が終了かを判断し（終了判断手順３４）、終了ならば、記入された診療記録を保存し（保存手順３５）、診察終了となる。手順３５では、診療記録は、例えば、図１に示したように診療記録テーブル１２３としてカルテデータベース１２に格納される。次に、手順３３に於いて、各種情報を入出力手段１５に表示する例を示す。
【００１６】図４は、本発明の実施例での入出力手段での画面表示例を示す図である。図４に示すように、表示画面４には、患者名４１、診療記録４２、診断支援情報４４、終了ボタン４５等が表示される。患者名欄４１は、例えば、表示欄右側のドロップダウンボタンを選択してドロップダウンリストを表示し、ドロップダウンリストの中から所望の患者を選択可能とする。また、診療記録４２には、診療記録テーブル１２３から読み込んだ

過去の診療の記録を表示する。診療記録は、表示欄右側のスクロールバーによって表示領域を変更し、過去にさかのぼって参照可能とする。また、過去の診療記録は消去や編集ができないようにし、改竄を防止する。記入は入出力手段１５を介して、自由文入力としても良いし、用語リストからの選択入力としても良いし、自由文入力と選択入力の組み合わせでも良い。音声入力、画像入力等他のあらゆる方法も適用可能とする。

【００１７】診断支援情報欄４４には、手順３２で抽出された関係式が示す推定疾患の他に、診察情報、遺伝子情報、疾患情報が表示される。これらの表示の切替えは、診断支援情報欄上部の診断支援情報切替タブ４３を選択して行なう。終了ボタン４５を選択すると、新規に入力された診療記録が保存され、作業終了となる。なお、入出力手段１５は、タッチパネル一体型液晶ディスプレイのような入力手段と出力手段が一体化した装置でも、キーボード、マウス、ペンタブレットとディスプレイ等、独立した複数の入力装置及び出力装置の組み合わせでも良い。次に、診断支援情報欄４４に於ける表示例の詳細を示す。

【００１８】図５は、本実施例での入出力手段での画面表示例の詳細を説明する図である。図５（ａ）は、推定疾患タブ５１を選択した時の診断支援情報欄の表示例である。推定疾患タブ５１が選択された時、診断支援情報欄には、推定疾患リスト５１１及び関係式欄５１２が表示される。推定疾患リスト５１１には、手順３２で抽出された疾患が、危険度の高い順に整列されて表示され、医師は患者が現在発症しているか将来発症する可能性の高い疾患を容易に推定できる。また、マウス等で選択された疾患は白黒反転やカラー変更により強調表示され、推定疾患を抽出するに至った関係式が、関係式欄５１２に表示される。

【００１９】図５（ｂ）は、診察情報タブ５２を選択した時の診断支援情報欄の表示例である。診察情報タブ５２が選択された時、診断支援情報情報欄には、診察情報リスト５２１が表示される。診察情報リスト５２１には、診察情報テーブル２２に格納された患者の主訴や既往歴や生活習慣や検査結果等の診察情報が表示され、医師は患者の診察情報を参照できる。もし、診察情報の内容が疾患推定の関係式を成立させている場合は、成立している関係式の相関ＩＤも併せて表示する。

【００２０】図５（ｃ）は、遺伝子情報タブ５３を選択した時の診断支援情報欄の表示例である。遺伝子情報タブ５３が選択された時、診断支援情報欄には、遺伝子情報リスト５３１が表示される。遺伝子情報リスト５３１には、遺伝子情報テーブル２１に格納された情報が表示され、医師は患者の遺伝子情報を参照できる。もし、遺伝子情報の内容が疾患推定の関係式を成立させている場合は、成立している関係式の相関ＩＤも併せて表示する。

【００２１】図５（ｄ）は、疾患情報タブ５４を選択した時の診断支援情報欄の表示例である。疾患情報タブ５４が選択された時、診断支援情報欄には、疾患名欄５４１、項目名欄５４２、内容欄５４３が表示される。疾患名欄、項目名欄、内容欄には、疾患情報テーブル２４に格納された情報が表示され、医師は疾患に関する各種情報を参照できる。疾患名欄５４１と項目名欄５４２は患者名欄４１のようにドロップダウンリストボックスとなっており、ドロップダウンリストから疾患と項目を選択して内容を内容欄５４３に表示できる。なお、各リストに表示される疾患ＩＤ、遺伝子ＩＤ、項目ＩＤ等は、マウスのダブルクリック等で選択指定すると、それぞれ対応する疾患情報、遺伝子情報、診察情報へと表示が切り替わり、医師が診断支援情報を順次参照できる。

【００２２】以上の例で示したように、本発明の電子カルテシステムによって、患者の遺伝子情報と診察情報の両方をもとに可能性の高い疾患を推定することが可能となる。但し最終的には、本システムが推定した疾患を参考に、医師が自己の責任で診断を下すものとする。

【００２３】以上説明した手順により、本システムを使用して医療行為を続けていくと、患者の遺伝子情報と診察情報、診断結果の情報が蓄積される。図１に示すように、遺伝子データベース１１には、患者の遺伝子に関する情報が遺伝子情報テーブル２１の形で格納される。一方、カルテデータベース１２には、患者の診察情報が診察情報テーブル２２の形で格納される。また、診察時に医師が入力した診療記録は、診療記録テーブル１２３の形で同じくカルテデータベース１２の中に格納される。最終的な医師の診断結果は、診療記録テーブル１２３の中に診療記録の一部として格納しても良いが、図１のように別個に診断結果テーブル１２４に格納しても良い。

【００２４】以上のように遺伝子データベース１１及びカルテデータベース１２に蓄積した情報を用いれば、遺伝子情報、及び診察情報と疾患との新たな相関関係が抽出可能となる。以下では、相関関係の抽出について説明する。本発明の診療支援システムは、蓄積した情報の中から、疾患推定手段１３が、医師の診断結果と、患者の遺伝子情報及び診察情報の組との新たな相関を抽出し、疾患データベース１４の相関テーブル２３を更新して事後の診療に利用する。

【００２５】図６は、本実施例での疾患推定のための情報を抽出する処理の流れを示す図である。先ず、疾患推定手段１３が、蓄積された遺伝子情報、診察情報、診断結果を読込む（読込手順６１）。次に、特定の診断結果と強い相関がある遺伝子情報や診察情報の条件の組を抽出する（条件抽出手順６２）。この条件の組とは、例えば、図２（ｃ）に示した関係式２３２の例のようなｉｆ－ｔｈｅｎ型の条件式でも良いし、危険率等の数値を解に持つ計算式でも良い。特定の診断結果と強い相関がある遺伝子情報や診察情報の条件の組の抽出には、クラス

タ分析、判別分析等の、多種多量のデータから因果関係やパターンを探索するデータマイニングの手法等を用いても良い。次に、抽出された関係式を入出力手段１５に表示し、医師が診療支援に利用できると判断した関係式を選択する入力を受け付ける（入出力手順６３）。次に、条件抽出の作業が終了か否かを判断し（終了判断手順６４）、終了ならば、選択された関係式を相関テーブルに保存し（保存手順６５）、抽出終了となる。

【００２６】以上の手法により、本発明の電子カルテシステムは、蓄積されたデータの中から、患者の遺伝子情報と診察情報の組み合わせと疾患との新たな相関関係を抽出し、医師が以降の診療で疾患の推定に活用可能とする。また、抽出された相関関係は、手順６５にて医師が診断支援に利用できると判断したものしか疾患推定に利用しないようにして、医学的に無意味な相関によって医師の判断が混乱する防止できる。

【００２７】

【発明の効果】本発明の電子カルテシステムでは、患者の遺伝子情報と、主訴や既往歴や生活習慣や検査結果等の診察情報との両方の情報をもとに、患者が現在発症しているか将来発症する可能性の高い疾患を推定することによって、医師の診断に於ける意思決定を支援し、疾患の早期発見及び早期治療を可能にするという著しい効果がある。この効果は、従来の問診を中心とする患者の先天的要因の取得でも、従来の特定の遺伝病に関する遺伝子診断でも達成できなかった効果であり、患者の先天的要因と後天的要因の両方を扱う本発明で初めて可能となる。

【００２８】また、本発明の電子カルテシステムを利用して診療を行なって蓄積された患者の遺伝子情報と診察情報、診断結果の情報をもとに、患者の遺伝子情報と診察情報の組み合わせと疾患との新たな相関を抽出して、疾患を推定する関係式が常に更新され、最新の情報に基づく疾患推定による診療支援が可能になるという著しい効果がある。また、新たに抽出した相関関係は、遺伝子医学上の新たな発見につながる可能性をも内包している。

【図面の簡単な説明】

【図１】本発明の実施例の電子カルテシステムの構成例を示す図。

【図２】本発明の実施例でのデータ格納形式の例を示す図。

【図３】本発明の実施例での診察時の処理の流れを示す図。

【図４】本発明の実施例での入出力手段での画面表示例を示す図。

【図５】本発明の実施例での入出力手段での画面表示例の詳細を説明する図。

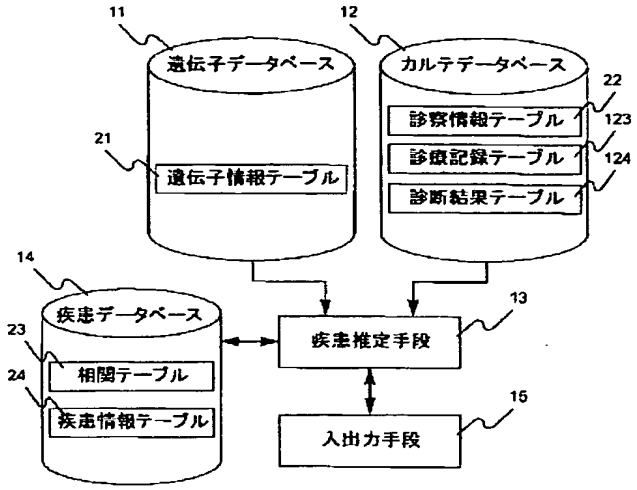
【図６】本発明の実施例での疾患推定のための情報を抽出する処理の流れを示す図。

【符号の説明】

１１…遺伝子データベース、１２…カルテデータベース、１２３…診療記録テーブル、１２４…診断結果テーブル、１３…疾患推定手段、１４…疾患データベース、１５…入出力手段、２１…遺伝子情報テーブル、２１１…患者ＩＤ、２１２…遺伝子ＩＤ、２１３…遺伝子名、２１４…遺伝子変異、２２…診察情報テーブル、２２１…患者ＩＤ、２２２…項目ＩＤ、２２３…項目名、２２４…結果値、２３…相関テーブル、２３１…相関ＩＤ、２３２…関係式、２３３…危険率、２３４…事例数、２４…疾患情報テーブル、２４１…疾患ＩＤ、２４２…疾患・症候群名、２４３…診断の指針、２４４…必要な検査、２４５…治療法、３１…読込手順、３２…疾患推定手順、３３…入出力手順、３４…終了判断手順、３５…保存手順、４…表示画面、４１…患者名欄、４２…診療記録、４３…診断支援情報切替タブ、４４…診断支援情報欄、４５…終了ボタン、５１…推定疾患タブ、５１１…推定疾患リスト、５１２…関係式欄、５２…診察情報タブ、５２１…診察情報リスト、５３…遺伝子情報タブ、５３１…遺伝子情報リスト、５４…疾患情報タブ、５４１…疾患名欄、５４２…項目名欄、５４３…内容欄、６１…読込手順、６２…条件抽出手順、６３…入出力手順、６４…終了判断手順、６５…保存手順。

【図１】

図 1



【図２】

図 2

(a)

遺伝子情報テーブル 21

211 患者ID	212 遺伝子ID	213 遺伝子名	214 遺伝子変異
P00001	GR0001	RET	0
P00001	GA0027	APC	1
P00001	GA0334	ATMc	0
P00001	GC1067	CDK4	0
…	…	…	…

(b)

診察情報テーブル 22

221 患者ID	222 項目ID	223 項目名	224 結果値
P00001	C01234	喫煙	0.6
P00001	C02345	飲酒	0.5
P00001	C03456	塩分	0.8
P00001	C04567	睡眠	0.3
…	…	…	…

(c)

相関テーブル 23

231 相関ID	232 関係式	233 危険率	234 事例数
R30203	if GR0001=1 and C04321<0.3 then DC3210	1.50	84
R30204	if GR0001=1 and C03332>0.8 then DC4321	1.73	32
R30205	if GR0001=1 and C03456>0.5 then DC5432	1.11	14
R30206	if GP0623=1 then DC6543	1.32	11
…	…	…	…

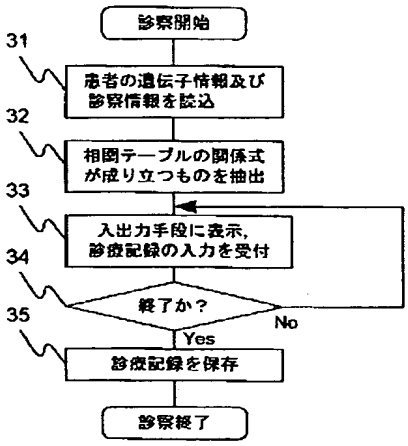
(d)

疾患情報テーブル 24

241 疾患ID	242 疾患名	243 診断の指針	244 必要な検査	245 合併症	…	246 治療法
DC3210	甲状腺髄様癌	○○○…	△△△…	×××…	…	□□□…
DC4321	大腸癌	…	…	…	…	…
DC5432	胃癌	…	…	…	…	…
DC6543	非ホジキンリンパ腫	…	…	…	…	…
…	…	…	…	…	…	…

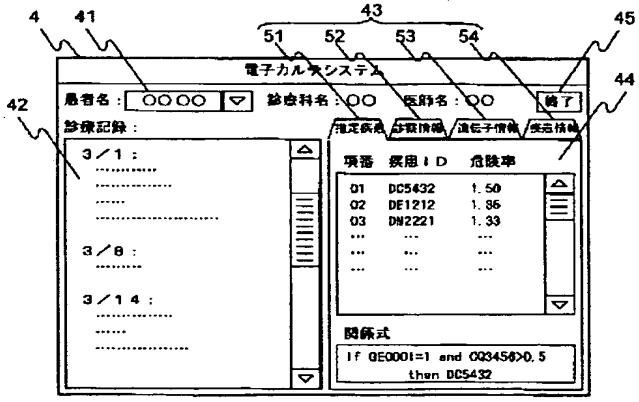
【図３】

図 3



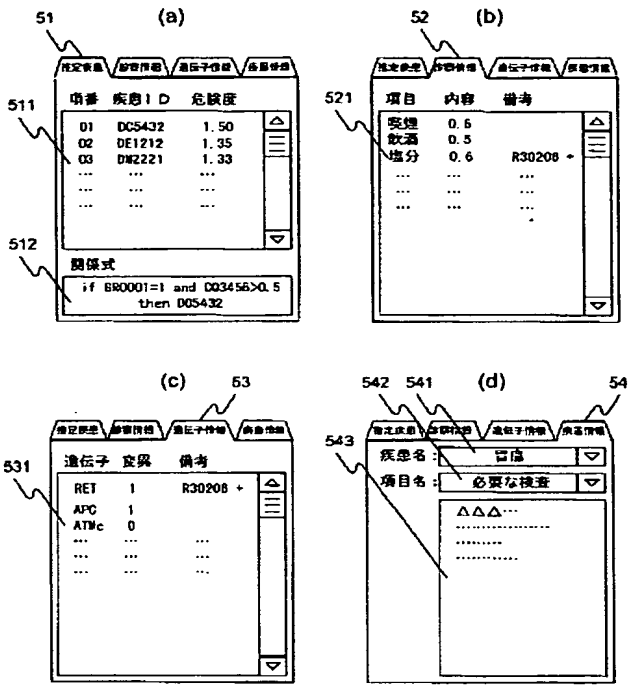
【図４】

図 4



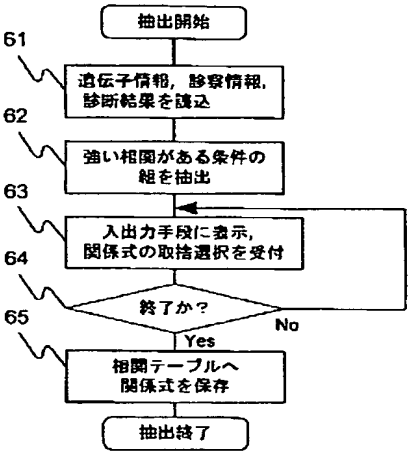
【図５】

図 5


51
(a)
511
項番　疾患ＩＤ　危険度
01　DC5432　1.50
02　DE1212　1.35
03　DM2221　1.33
512
関係式
if GR0001=1 and D03456>0.5
then D05432
52
(b)
521
項目　内容　備考
喫煙　0.6
飲酒　0.5
塩分　0.6　R30208
(c)
53
531
遺伝子　変異　備考
RET　1　R30208
APC　1
ATWc　0
542
541
(d)
54
543
疾患名：
項目名：
必要な検査
△△△…

【図６】

図 6


抽出開始
61
遺伝子情報，診察情報，
診断結果を読込
62
強い相関がある条件の
組を抽出
63
入出力手段に表示，
関係式の取捨選択を受付
64
終了か？
No
Yes
65
相関テーブルへ
関係式を保存
抽出終了

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-067139
(43)Date of publication of application : 03.03.2000

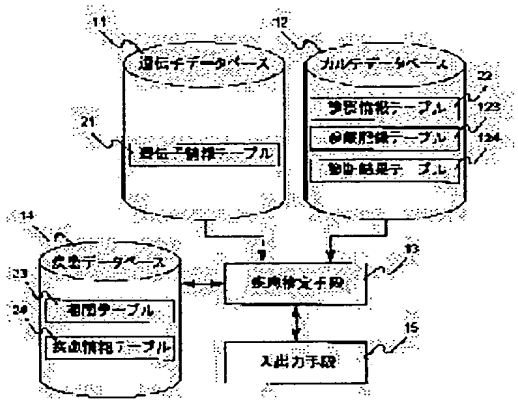
(51)Int.Cl. G06F 19/00

(21)Application number : 10-238078
(22)Date of filing : 25.08.1998

(71)Applicant : HITACHI LTD
(72)Inventor : SASAKI HAJIME
MATSUO HITOSHI
IRIE RYOTARO

(54) ELECTRONIC MEDICAL SHEET SYSTEM

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an electronic medical sheet system for presuming the disease which a patient suffers from at present or which a patient will possibly suffers from in future from the genetic information and medical examination information of the patient.
SOLUTION: The information stored in a genetic data base 11 and a medical sheet data base 12 is read out by a disease presuming means 13 and a correlation table 23 storing the correlation between the genetic and medical examination information and the disease is retrieved. The disease which a patient will suffer from with high probability is extracted and displayed on an input/output means 15. Based on the stored information, the disease presuming means 13 extracts the new correlative relation, adds it to the correlation table 23 and utilizes it for the following medical examination. Thus, the determination of will for the doctor in the case of diagnosis is supported and the disease can be early discovered and treated.



LEGAL STATUS

[Date of request for examination] 25.03.2004
[Date of sending the examiner's decision of rejection]
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]
[Date of final disposal for application]
[Patent number]
[Date of registration]
[Number of appeal against examiner's decision of rejection]
[Date of requesting appeal against examiner's decision of rejection]
[Date of extinction of right]

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Translation for JP 2000-67139

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CLAIMS

[Claim(s)]
[Claim 1] The gene database which stored a patient's gene information, and the clinical recording database which stored said patient's medical examination information, The disease database which stored said gene information, and the correlation and disease information on said medical examination information and disease, Based on the information stored in both said gene databases and said clinical recording databases, by searching said disease database The electronic chart system characterized by having a disease presumption means to presume the high disease of possibility of showing the symptoms of whether said patient doing the current onset in the future, and an output means to output the disease presumed by this disease presumption means, and said disease information.
[Claim 2] The electronic chart system characterized by updating the information which said disease presumption means extracted the new correlation with a medical practitioner's diagnostic result and the group of said gene information of said patient, and said medical examination information, and stored in the correlation table of said disease database in the electronic chart system of claim 1 out of the information accumulated in said gene database and said clinical recording database.
[Claim 3] The electronic chart system characterized by displaying said disease information on said medical examination information stored in said clinical recording database, said disease which said disease presumption means presumed, and said disease stored in said disease database in the electronic chart system of claim 1 or claim 2 using said output means.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the electronic chart system by which a medical practitioner presumes and presents the high disease of possibility about the electronic chart system used for a medical action based on both a patient's gene information and medical examination information especially.
[0002]
[Description of the Prior Art] With the conventional medical examination in medicine, it is using for the diagnosis with reference to information, such as an oral consultation result and an inspection result, as patient information. In order to draw a diagnosis, it is used for a decision ingredient as information also with the background of the patient of until very important [it comes to receive not only the present condition of the patient by the inspection result, palpation, auscultation, etc. but a medical examination]. There are acquired factors, such as a lifestyle, and native factors, such as a body and heredity, in a patient's background, and both are important for it. The information about an acquired factor is mainly collected by oral consultation, and the information about a native factor is recorded after listening mainly to the family history of a patient's parents, twin, etc. On the other hand, the gene which participates in the onset was solved about specific illness with the advance of genetic research, and preclinical diagnosis became possible. It is predicted that the disease which can carry out the diagnosis before generating from gene information will increase increasingly from now on. (A special edition "the genetic research which changes medical examination every day", Nikkei Medical, the August, 1997 issue, pp.60-71)
[0003]
[Problem(s) to be Solved by the Invention] In the site of medical examination, the information about acquired factors, such as a patient's present condition by the inspection result, palpation, auscultation, etc. and a lifestyle by oral consultation etc., is comparatively collected by the detail. However, as for the information about a patient's native factor, only family history extent was collected with the conventional medical examination. With family history, when having died [the configuration of several families, such as a patient's parents twin, etc. and / whether it is living, whether there is any big illness, and], death age, the cause of death, etc. are listened to them and recorded from a patient. Therefore, since it depends for family history on storage of a patient in the top with little amount of information, its informational dependability is low. However, when the information on a native factor had stopped except family history guessing from a part of progress of development, or body view and view of blood collecting and having been compared with the importance of a native factor, it was information also with both insufficient amounts and quality.
[0004] On the other hand, about gene diagnosis, it was limited to a specific hereditary disease in which the abnormalities of an independent gene show the symptoms of the diagnosis actually being performed by clinical owing to. Although the symptoms of many diseases other than a hereditary disease were shown with the combination of the native factor by heredity, and acquired factors, such as a lifestyle and an environment, in the approach of the gene diagnosis only using the information on the conventional native factor, a diagnosis and onset prediction were difficult for them.
[0005] The purpose of this invention is based on both a patient's gene information and the medical examination information of a patient to offer [whether the patient has shown the symptoms now and] the electronic chart system which presumes the high disease of possibility that symptoms will develop in the future.
[0006]
[Means for Solving the Problem] The gene database with which the electronic chart system of this invention

stored a patient's gene information, The clinical recording database which stored medical examination information, such as a patient's chief complaint and anamnesis, a lifestyle, and an inspection result, medical-examination record, a diagnostic result, etc., The disease database which stored the correlation and disease information on gene information and medical examination information, and a disease, A disease database is searched based on the information stored in both the gene database and the clinical recording database. A patient has a disease presumption means to presume the high disease of possibility of showing the symptoms of whether the current onset being carried out in the future, and an output means to output the disease and disease information which were presumed by the disease presumption means, and to show a medical practitioner. Moreover, out of the information accumulated in the gene database and the clinical recording database, a disease presumption means extracts the new correlation with a medical practitioner's diagnostic result and the group of a patient's gene information and medical examination information, and uses for a subsequent medical examination by updating the information stored in the correlation table of a disease database. Furthermore, using an output means, on 1 screen, simultaneous, it changes and the disease information on the medical examination information stored in the clinical recording database, medical-examination record, a diagnostic result, etc. the disease that the disease presumption means presumed, and the disease stored in the disease database is displayed. The above configuration enables it to perform exact diagnosis and onset prediction based on both the patient gene information about a native factor, and the medical examination information about an acquired factor and the present condition.

[0007]

[Embodiment of the Invention] Drawing 1 is drawing showing the example of the electronic chart structure of a system of the example of this invention. The gene database 11 with which the electronic chart system of this example stored a patient's gene information, The clinical recording database 12 which stored a patient's medical examination information, medical-examination record, a diagnostic result, etc., The disease database 14 which stored the correlation and disease information on gene information, medical examination information, and a disease, Provide the disease presumption means 13 and the I/O means 15, and the disease presumption means 13 searches the disease database 14 based on the information stored in both the gene database 11 and the clinical recording database 12. The high disease of possibility of showing the symptoms of whether the patient doing the current onset in the future is presumed, and a presumed disease and disease information are outputted from the I/O means 15. Hereafter, the example of the processing which presumes a disease is explained using drawing 5 from drawing 2 .

[0008] First, the example of the format of storing required information in the gene database 11, the clinical recording database 12, and the disease database 14 is explained.

[0009] Drawing 2 is drawing showing the example of the data storage format in the example of this invention.

[0010] It stores in the 1st in the form of the gene information table 21 which shows the information about a patient's gene in the gene database 11 at drawing 2 (a). A patient ID 211, a gene ID 212, the gene name 213, and gene variation 214 grade are stored in the gene information table 21. Although the example of drawing 2 is expressing the existence of variation for the numeric value of 1 and 0, the class of variation may be stored with a notation. Moreover, it may not store for every gene name, but you may store as a group of the class of genetic screening, and an inspection result.

[0011] It stores in the 2nd in the form of the medical examination information table 22 which shows medical examination information, such as a chief complaint, an anamnesis, a lifestyle, and an inspection result, in the clinical recording database 12 at drawing 2 (b). Value 224 grade is stored in the medical examination information table 22 as a result of a patient ID 221, an item ID 222, and a subject name 223. Although the result of oral consultation is normalized and expressed to the real numbers from 0 to 1 in the example of drawing 2 , an alphabetic character, a notation, etc. which were defined beforehand may express. Moreover, the result of biochemical inspection etc. may store the numeric value of an inspection result as it is.

[0012] As a result of a patient's gene information or medical examination information, the correlation of a value and the high disease of possibility that symptoms will develop is the form of the correlation table 23 shown in drawing 2 R> 2 (c), and is stored [3rd] in the disease database 14. The number of examples 234 grade showing the number of examples with which the level of significance 233 showing possibility that the relational expression 232 and relational expression 232 showing correlation with correlation ID 231, gene information and medical examination information, and a disease will be materialized, and relational expression 232 were materialized is stored in the correlation table 23. The correlation extracted out of are recording data by the approach which may store the correlation proved theoretically or statistically and is mentioned later is sufficient as relational

expression 232.
[0013] In the example of drawing 2 , although relational expression 232 is described by the conditional expression of an if-then mold, level of significance may be described in the formula made into a solution. Moreover, although the scale factor shows the height of onset establishment of [level of significance / homogeneous healthy people of the same age] statistically in the example of drawing 2 , percent may show the onset probability itself.
[0014] It stores in the disease database 14 in the form of the disease table 24 which shows the information about the disease itself in the 4th at drawing 2 (d). A disease ID 241, the disease name 242, the guide 243 of a diagnosis, the required inspection 244, complication 245, and cure 246 grade are stored in the disease information table 24. Although prepared as what is used for a medical practitioner checking the information stored in the disease information table, or building a treatment policy, it is not necessary to necessarily provide the information on 243-246. In addition, in drawing 1 , although the gene database 11, the clinical recording database 12, and the disease database 14 are written separately, respectively, even if it manages with the gestalt which showed information to drawing 1 and manages collectively in a single database, they may be distributed and managed in two or more databases connected to the network. Moreover, you may apply in the form where you make it cooperate with an international gene database and a disease gene database of the research facilities of each country which are introduced to reference (gene medicine, Vol.2, No.1, pp.135-145).
[0015] Drawing 3 is drawing showing the flow of the processing at the time of the usual medical examination by this example. First, in the case of medical examination initiation, the disease presumption means 13 reads information from a patient's gene database 11 and clinical recording database 12 (reading procedure 31), and that in which the relational expression 232 of the correlation table 23 in the disease database 14 is materialized is extracted at it (disease presumption procedure 32). Moreover, the disease information about the disease which the extracted relational expression shows is also read from the disease information table 24 of the disease database 14. The information which gathered in the above processing, i.e., a patient's gene information, medical examination information, and the disease information on the presumed disease are displayed on the I/O means 15, and are changed into the condition that entry of medical-examination record can be performed (I/O procedure 33). Accepting the input of the medical-examination record by the medical practitioner, a medical examination judges whether it is termination (termination decision procedure 34), and if it is termination, the filled-in medical-examination record will be saved (preservation procedure 35), and it will become medical examination termination. In a procedure 35, medical-examination record is stored in the clinical recording database 12 as a medical-examination record table 123, as shown in drawing 1 . Next, in a procedure 33, the example which displays various information on the I/O means 15 is shown.
[0016] Drawing 4 is drawing showing the example of a screen display in the I/O means in the example of this invention. As shown in drawing 4 , a name of patient 41, the medical-examination record 42, the diagnostic support information 44, and termination carbon button 45 grade are displayed on a display screen 4. The name-of-patient column 41 chooses the drop down carbon button for example, on the right-hand side of a display column, displays a drop down list, and makes a desired patient selectable out of a drop down list. Moreover, record of the medical examination of the past read from the medical-examination record table 123 is displayed on the medical-examination record 42. With the scroll bar on the right-hand side of a display column, medical-examination record changes a viewing area, went back in the past, and reference of it is enabled. Moreover, the past medical-examination record can be made to perform neither elimination nor edit, and prevents an alteration. Entry may be good also as a free sentence input through the I/O means 15, and may be good also as a selection input from a vocabulary list, and the combination of a free sentence input and a selection input is sufficient as it. It carries out to all other approaches, such as voice input and an image input, being applicable.
[0017] The medical examination information, gene information, and disease information other than the presumed disease which the relational expression extracted in the procedure 32 shows are displayed on the diagnostic support information column 44. The change of these displays is performed by choosing the diagnostic support information change tab 43 of the diagnostic support information column upper part. If the termination carbon button 45 is chosen, the medical-examination record inputted newly will be saved and it will become activity termination. In addition, combination of two or more independent input units and an output unit, such as a keyboard, a mouse, a pen tablet, and a display, is sufficient as the I/O means 15 also with the equipment which an input means like a touch panel one apparatus liquid crystal display and the output means unified. Next, the detail of the example of a display in the diagnostic support information column 44 is shown.
[0018] Drawing 5 is drawing explaining the detail of the example of a screen display in the I/O means in this example. Drawing 5 (a) is the example of a display of the diagnostic support information column when choosing

the presumed disease tab 51. When the presumed disease tab 51 is chosen, the presumed disease list 511 and the relational-expression column 512 are displayed on the diagnostic support information column. The disease extracted in the procedure 32 is displayed in line on order with high danger by the presumed disease list 511, and a medical practitioner can presume easily the high disease of possibility of showing the symptoms of whether the patient doing the current onset in the future, on it. Moreover, relational expression is displayed [which highlighting of the disease chosen with the mouse etc. is carried out by tone reversal and color modification, and came to extract the presumed disease] on the relational-expression column 512.

[0019] Drawing 5 (b) is the example of a display of the diagnostic support information column when choosing the medical examination information tab 52. When the medical examination information tab 52 is chosen, the medical examination information list 521 is displayed on the diagnostic support information information column. Medical examination information stored in the medical examination information table 22, such as a patient's chief complaint and anamnesis, a lifestyle, and an inspection result, is displayed on the medical examination information list 521, and a medical practitioner can refer to a patient's medical examination information. When the contents of medical examination information are forming the relational expression of disease presumption, the correlation ID of the materialized relational expression is displayed collectively.

[0020] Drawing 5 (c) is the example of a display of the diagnostic support information column when choosing the gene information tab 53. When the gene information tab 53 is chosen, the gene information list 531 is displayed on the diagnostic support information column. The information stored in the gene information table 21 is displayed on the gene information list 531, and a medical practitioner can refer to a patient's gene information. When the contents of gene information are forming the relational expression of disease presumption, the correlation ID of the materialized relational expression is displayed collectively.

[0021] Drawing 5 (d) is the example of a display of the diagnostic support information column when choosing the disease information tab 54. When the disease information tab 54 is chosen, the disease name column 541, the subject name column 542, and the contents column 543 are displayed on the diagnostic support information column. The information stored in the disease information table 24 is displayed on the disease name column, the subject name column, and the contents column, and a medical practitioner can refer to the various information about a disease. The disease name column 541 and the subject name column 542 serve as a drop down list box like the name-of-patient column 41, choose a disease and an item from a drop down list, and can display the contents on the contents column 543. In addition, if the disease ID displayed on each list, Gene ID, Item ID, etc. carry out selection assignment in the double click of a mouse etc., a display will change to the disease information which corresponds, respectively, gene information, and medical examination information, and a medical practitioner can carry out sequential reference of the diagnostic support information.

[0022] As the above example showed, the electronic chart system of this invention enables it to presume the high disease of possibility based on both a patient's gene information and medical examination information. However, finally a medical practitioner shall give a diagnosis for the disease which this system presumed to reference on self responsibility.

[0023] If the medical action is continued with the procedure explained above using this system, a patient's gene information, and medical examination information and the information on a diagnostic result will be accumulated. As shown in drawing 1 , the information about a patient's gene is stored in the gene database 11 in the form of the gene information table 21. On the other hand, a patient's medical examination information is stored in the clinical recording database 12 in the form of the medical examination information table 22. Moreover, similarly the medical-examination record which the medical practitioner inputted at the time of a medical examination is stored in the clinical recording database 12 in the form of the medical-examination record table 123. Although a medical practitioner's final diagnostic result may be stored as a part of medical-examination record in the medical-examination record table 123, it may be separately stored in the diagnostic resulting table 124 like drawing 1 .

[0024] If the information accumulated in the gene database 11 and the clinical recording database 12 as mentioned above is used, the extract of the new correlation of gene information and medical examination information, and a disease will be attained. Below, the extract of a correlation is explained. Out of the accumulated information, the disease presumption means 13 extracts the new correlation with a medical practitioner's diagnostic result and the group of a patient's gene information and medical examination information, updates the correlation table 23 of the disease database 14, and the medical-examination support system of this invention uses it for a subsequent medical examination.

[0025] Drawing 6 is drawing showing the flow of the processing which extracts the information for disease

presumption by this example. First, the disease presumption means 13 reads the accumulated gene information, medical examination information, and a diagnostic result (reading procedure 61). Next, the group of the conditions of gene information with a specific diagnostic result and strong correlation or medical examination information is extracted (condition extract procedure 62). The conditional expression of an if-then mold like the example of the relational expression 232 shown in drawing 2 (c) is sufficient as the group of this condition, and the formula which has numeric values, such as level of significance, in a solution is sufficient as it. The technique of data mining of looking for causal relation or a pattern etc. may be used for the extract of the group of the conditions of gene information with a specific diagnostic result and strong correlation, or medical examination information from data of a variety large quantity, such as a cluster analysis and discriminant analysis. Next, the extracted relational expression is displayed on the I/O means 15, and the input which chooses the relational expression judged that a medical practitioner can use for medical-examination exchange is received (I/O procedure 63). Next, the activity of a condition extract saves the relational expression which judged whether it was termination (termination decision procedure 64), and was chosen when it was termination on a correlation table (preservation procedure 65), and serves as extract termination.

[0026] By the above technique, out of the stored data, the electronic chart system of this invention extracts the new correlation of a patient's gene information, the combination of medical examination information, and a disease, and presupposes that the activity to presumption of a disease is possible for a medical practitioner with subsequent medical examination. Moreover, medically, by meaningless correlation, decision of a medical practitioner gets confused and only what was judged that a medical practitioner can use the extracted correlation for diagnostic exchange in a procedure 65 can be prevented, as it does not use for disease presumption.

[0027]

[Effect of the Invention] Based on a patient's gene information and the information on both medical examination information, such as a chief complaint, an anamnesis, a lifestyle, and an inspection result, whether the patient has shown the symptoms now and by presuming the high disease of possibility that symptoms will develop in the future, decision making in a diagnosis of a medical practitioner is supported, and there is remarkable effectiveness of making possible the early detection and early treatment of a disease, in the electronic chart system of this invention. Acquisition of the native factor of the patient centering on the conventional oral consultation is also the effectiveness which was not able to attain the gene diagnosis about the conventional specific hereditary disease, either, and this effectiveness becomes possible for the first time by this invention treating both a patient's native factor and an acquired factor.

[0028] Moreover, based on a patient's gene information treated and accumulated using the electronic chart system of this invention, and medical examination information and the information on a diagnostic result, the new correlation with a patient's gene information, the combination of medical examination information, and a disease is extracted, the relational expression which presumes a disease is always updated, and there is remarkable effectiveness that the medical-examination exchange by disease presumption based on the newest information is attained. Moreover, the newly extracted correlation has also connoted possibility of leading to the new discovery on gene medicine.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the electronic chart system by which a medical practitioner presumes and presents the high disease of possibility about the electronic chart system used for a medical action based on both a patient's gene information and medical examination information especially.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] With the conventional medical examination in medicine, it is using for the diagnosis with reference to information, such as an oral consultation result and an inspection result, as patient information. In order to draw a diagnosis, it is used for a decision ingredient as information also with the background of the patient of until very important [it comes to receive not only the present condition of the patient by the inspection result, palpation, auscultation, etc. but a medical examination]. There are acquired factors, such as a lifestyle, and native factors, such as a body and heredity, in a patient's background, and both are important for it. The information about an acquired factor is mainly collected by oral consultation, and the information about a native factor is recorded after listening mainly to the family history of a patient's parents, twin, etc. On the other hand, the gene which participates in the onset was solved about specific illness with the advance of genetic research, and preclinical diagnosis became possible. It is predicted that the disease which can carry out the diagnosis before generating from gene information will increase increasingly from now on. (A special edition "the genetic research which changes medical examination every day", Nikkei Medical, the August, 1997 issue, pp.60-71)

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EFFECT OF THE INVENTION

[Effect of the Invention] Based on a patient's gene information and the information on both medical examination information, such as a chief complaint, an anamnesis, a lifestyle, and an inspection result, whether the patient has shown the symptoms now and by presuming the high disease of possibility that symptoms will develop in the future, decision making in a diagnosis of a medical practitioner is supported, and there is remarkable effectiveness of making possible the early detection and early treatment of a disease, in the electronic chart system of this invention. Acquisition of the native factor of the patient centering on the conventional oral consultation is also the effectiveness which was not able to attain the gene diagnosis about the conventional specific hereditary disease, either, and this effectiveness becomes possible for the first time by this invention treating both a patient's native factor and an acquired factor.
[0028] Moreover, based on a patient's gene information treated and accumulated using the electronic chart system of this invention, and medical examination information and the information on a diagnostic result, the new correlation with a patient's gene information, the combination of medical examination information, and a disease is extracted, the relational expression which presumes a disease is always updated, and there is remarkable effectiveness that the medical-examination exchange by disease presumption based on the newest information is attained. Moreover, the newly extracted correlation has also connoted possibility of leading to the new discovery on gene medicine.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In the site of medical examination, the information about acquired factors, such as a patient's present condition by the inspection result, palpation, auscultation, etc. and a lifestyle by oral consultation etc., is comparatively collected by the detail. However, as for the information about a patient's native factor, only family history extent was collected with the conventional medical examination. With family history, when having died [the configuration of several families, such as a patient's parents twin, etc. and / whether it is living, whether there is any big illness, and], death age, the cause of death, etc. are listened to them and recorded from a patient. Therefore, since it depends for family history on storage of a patient in the top with little amount of information, its informational dependability is low. However, when the information on a native factor had stopped except family history guessing from a part of progress of development, or body view and view of blood collecting and having been compared with the importance of a native factor, it was information also with both insufficient amounts and quality.

[0004] On the other hand, about gene diagnosis, it was limited to a specific hereditary disease in which the abnormalities of an independent gene show the symptoms of the diagnosis actually being performed by clinical owing to. Although the symptoms of many diseases other than a hereditary disease were shown with the combination of the native factor by heredity, and acquired factors, such as a lifestyle and an environment, in the approach of the gene diagnosis only using the information on the conventional native factor, a diagnosis and onset prediction were difficult for them.

[0005] The purpose of this invention is based on both a patient's gene information and the medical examination information of a patient to offer [whether the patient has shown the symptoms now and] the electronic chart system which presumes the high disease of possibility that symptoms will develop in the future.

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MEANS

[Means for Solving the Problem] The gene database with which the electronic chart system of this invention stored a patient's gene information, The clinical recording database which stored medical examination information, such as a patient's chief complaint and anamnesis, a lifestyle, and an inspection result, medical-examination record, a diagnostic result, etc., The disease database which stored the correlation and disease information on gene information and medical examination information, and a disease, A disease database is searched based on the information stored in both the gene database and the clinical recording database. A patient has a disease presumption means to presume the high disease of possibility of showing the symptoms of whether the current onset being carried out in the future, and an output means to output the disease and disease information which were presumed by the disease presumption means, and to show a medical practitioner. Moreover, out of the information accumulated in the gene database and the clinical recording database, a disease presumption means extracts the new correlation with a medical practitioner's diagnostic result and the group of a patient's gene information and medical examination information, and uses for a subsequent medical examination by updating the information stored in the correlation table of a disease database. Furthermore, using an output means, on 1 screen, simultaneous, it changes and the disease information on the medical examination information stored in the clinical recording database, medical-examination record, a diagnostic result, etc. the disease that the disease presumption means presumed, and the disease stored in the disease database is displayed. The above configuration enables it to perform exact diagnosis and onset prediction based on both the patient gene information about a native factor, and the medical examination information about an acquired factor and the present condition.
[0007]
[Embodiment of the Invention] Drawing 1 is drawing showing the example of the electronic chart structure of a system of the example of this invention. The gene database 11 with which the electronic chart system of this example stored a patient's gene information, The clinical recording database 12 which stored a patient's medical examination information, medical-examination record, a diagnostic result, etc., The disease database 14 which stored the correlation and disease information on gene information, medical examination information, and a disease, Provide the disease presumption means 13 and the I/O means 15, and the disease presumption means 13 searches the disease database 14 based on the information stored in both the gene database 11 and the clinical recording database 12. The high disease of possibility of showing the symptoms of whether the patient doing the current onset in the future is presumed, and a presumed disease and disease information are outputted from the I/O means 15. Hereafter, the example of the processing which presumes a disease is explained using drawing 5 from drawing 2 .
[0008] First, the example of the format of storing required information in the gene database 11, the clinical recording database 12, and the disease database 14 is explained.
[0009] Drawing 2 is drawing showing the example of the data storage format in the example of this invention.
[0010] It stores in the 1st in the form of the gene information table 21 which shows the information about a patient's gene in the gene database 11 at drawing 2 (a). A patient ID 211, a gene ID 212, the gene name 213, and gene variation 214 grade are stored in the gene information table 21. Although the example of drawing 2 is expressing the existence of variation for the numeric value of 1 and 0, the class of variation may be stored with a notation. Moreover, it may not store for every gene name, but you may store as a group of the class of genetic screening, and an inspection result.
[0011] It stores in the 2nd in the form of the medical examination information table 22 which shows medical examination information, such as a chief complaint, an anamnesis, a lifestyle, and an inspection result, in the

clinical recording database 12 at drawing 2 (b). Value 224 grade is stored in the medical examination information table 22 as a result of a patient ID 221, an item ID 222, and a subject name 223. Although the result of oral consultation is normalized and expressed to the real numbers from 0 to 1 in the example of drawing 2 , an alphabetic character, a notation, etc. which were defined beforehand may express. Moreover, the result of biochemical inspection etc. may store the numeric value of an inspection result as it is.

[0012] As a result of a patient's gene information or medical examination information, the correlation of a value and the high disease of possibility that symptoms will develop is the form of the correlation table 23 shown in drawing 2 R> 2 (c), and is stored [3rd] in the disease database 14. The number of examples 234 grade showing the number of examples with which the level of significance 233 showing possibility that the relational expression 232 and relational expression 232 showing correlation with correlation ID 231, gene information and medical examination information, and a disease will be materialized, and relational expression 232 were materialized is stored in the correlation table 23. The correlation extracted out of are recording data by the approach which may store the correlation proved theoretically or statistically and is mentioned later is sufficient as relational expression 232.

[0013] In the example of drawing 2 , although relational expression 232 is described by the conditional expression of an if-then mold, level of significance may be described in the formula made into a solution. Moreover, although the scale factor shows the height of onset establishment of [level of significance / homogeneous healthy people of the same age] statistically in the example of drawing 2 , percent may show the onset probability itself.

[0014] It stores in the disease database 14 in the form of the disease table 24 which shows the information about the disease itself in the 4th at drawing 2 (d). A disease ID 241, the disease name 242, the guide 243 of a diagnosis, the required inspection 244, complication 245, and cure 246 grade are stored in the disease information table 24. Although prepared as what is used for a medical practitioner checking the information stored in the disease information table, or building a treatment policy, it is not necessary to necessarily provide the information on 243-246. In addition, in drawing 1 , although the gene database 11, the clinical recording database 12, and the disease database 14 are written separately, respectively, even if it manages with the gestalt which showed information to drawing 1 and manages collectively in a single database, they may be distributed and managed in two or more databases connected to the network. Moreover, you may apply in the form where you make it cooperate with an international gene database and a disease gene database of the research facilities of each country which are introduced to reference (gene medicine, Vol.2, No.1, pp.135-145).

[0015] Drawing 3 is drawing showing the flow of the processing at the time of the usual medical examination by this example. First, in the case of medical examination initiation, the disease presumption means 13 reads information from a patient's gene database 11 and clinical recording database 12 (reading procedure 31), and that in which the relational expression 232 of the correlation table 23 in the disease database 14 is materialized is extracted at it (disease presumption procedure 32). Moreover, the disease information about the disease which the extracted relational expression shows is also read from the disease information table 24 of the disease database 14. The information which gathered in the above processing, i.e., a patient's gene information, medical examination information, and the disease information on the presumed disease are displayed on the I/O means 15, and are changed into the condition that entry of medical-examination record can be performed (I/O procedure 33). Accepting the input of the medical-examination record by the medical practitioner, a medical examination judges whether it is termination (termination decision procedure 34), and if it is termination, the filled-in medical-examination record will be saved (preservation procedure 35), and it will become medical examination termination. In a procedure 35, medical-examination record is stored in the clinical recording database 12 as a medical-examination record table 123, as shown in drawing 1 . Next, in a procedure 33, the example which displays various information on the I/O means 15 is shown.

[0016] Drawing 4 is drawing showing the example of a screen display in the I/O means in the example of this invention. As shown in drawing 4 , a name of patient 41, the medical-examination record 42, the diagnostic support information 44, and termination carbon button 45 grade are displayed on a display screen 4. The name-of-patient column 41 chooses the drop down carbon button for example, on the right-hand side of a display column, displays a drop down list, and makes a desired patient selectable out of a drop down list. Moreover, record of the medical examination of the past read from the medical-examination record table 123 is displayed on the medical-examination record 42. With the scroll bar on the right-hand side of a display column, medical-examination record changes a viewing area, went back in the past, and reference of it is enabled. Moreover, the past medical-examination record can be made to perform neither elimination nor edit, and prevents an alteration. Entry may be good also as a free sentence input through the I/O means 15, and may be good also as a selection

input from a vocabulary list, and the combination of a free sentence input and a selection input is sufficient as it. It carries out to all other approaches, such as voice input and an image input, being applicable.
[0017] The medical examination information, gene information, and disease information other than the presumed disease which the relational expression extracted in the procedure 32 shows are displayed on the diagnostic support information column 44. The change of these displays is performed by choosing the diagnostic support information change tab 43 of the diagnostic support information column upper part. If the termination carbon button 45 is chosen, the medical-examination record inputted newly will be saved and it will become activity termination. In addition, combination of two or more independent input units and an output unit, such as a keyboard, a mouse, a pen tablet, and a display, is sufficient as the I/O means 15 also with the equipment which an input means like a touch panel one apparatus liquid crystal display and the output means unified. Next, the detail of the example of a display in the diagnostic support information column 44 is shown.
[0018] Drawing 5 is drawing explaining the detail of the example of a screen display in the I/O means in this example. Drawing 5 (a) is the example of a display of the diagnostic support information column when choosing the presumed disease tab 51. When the presumed disease tab 51 is chosen, the presumed disease list 511 and the relational-expression column 512 are displayed on the diagnostic support information column. The disease extracted in the procedure 32 is displayed in line on order with high danger by the presumed disease list 511, and a medical practitioner can presume easily the high disease of possibility of showing the symptoms of whether the patient doing the current onset in the future, on it. Moreover, relational expression is displayed [which highlighting of the disease chosen with the mouse etc. is carried out by tone reversal and color modification, and came to extract the presumed disease] on the relational-expression column 512.
[0019] Drawing 5 (b) is the example of a display of the diagnostic support information column when choosing the medical examination information tab 52. When the medical examination information tab 52 is chosen, the medical examination information list 521 is displayed on the diagnostic support information information column. Medical examination information stored in the medical examination information table 22, such as a patient's chief complaint and anamnesis, a lifestyle, and an inspection result, is displayed on the medical examination information list 521, and a medical practitioner can refer to a patient's medical examination information. When the contents of medical examination information are forming the relational expression of disease presumption, the correlation ID of the materialized relational expression is displayed collectively.
[0020] Drawing 5 (c) is the example of a display of the diagnostic support information column when choosing the gene information tab 53. When the gene information tab 53 is chosen, the gene information list 531 is displayed on the diagnostic support information column. The information stored in the gene information table 21 is displayed on the gene information list 531, and a medical practitioner can refer to a patient's gene information. When the contents of gene information are forming the relational expression of disease presumption, the correlation ID of the materialized relational expression is displayed collectively.
[0021] Drawing 5 (d) is the example of a display of the diagnostic support information column when choosing the disease information tab 54. When the disease information tab 54 is chosen, the disease name column 541, the subject name column 542, and the contents column 543 are displayed on the diagnostic support information column. The information stored in the disease information table 24 is displayed on the disease name column, the subject name column, and the contents column, and a medical practitioner can refer to the various information about a disease. The disease name column 541 and the subject name column 542 serve as a drop down list box like the name-of-patient column 41, choose a disease and an item from a drop down list, and can display the contents on the contents column 543. In addition, if the disease ID displayed on each list, Gene ID, Item ID, etc. carry out selection assignment in the double click of a mouse etc., a display will change to the disease information which corresponds, respectively, gene information, and medical examination information, and a medical practitioner can carry out sequential reference of the diagnostic support information.
[0022] As the above example showed, the electronic chart system of this invention enables it to presume the high disease of possibility based on both a patient's gene information and medical examination information. However, finally a medical practitioner shall give a diagnosis for the disease which this system presumed to reference on self responsibility.
[0023] If the medical action is continued with the procedure explained above using this system, a patient's gene information, and medical examination information and the information on a diagnostic result will be accumulated. As shown in drawing 1 , the information about a patient's gene is stored in the gene database 11 in the form of the gene information table 21. On the other hand, a patient's medical examination information is stored in the clinical recording database 12 in the form of the medical examination information table 22. Moreover, similarly

the medical-examination record which the medical practitioner inputted at the time of a medical examination is stored in the clinical recording database 12 in the form of the medical-examination record table 123. Although a medical practitioner's final diagnostic result may be stored as a part of medical-examination record in the medical-examination record table 123, it may be separately stored in the diagnostic resulting table 124 like drawing 1 .

[0024] If the information accumulated in the gene database 11 and the clinical recording database 12 as mentioned above is used, the extract of the new correlation of gene information and medical examination information, and a disease will be attained. Below, the extract of a correlation is explained. Out of the accumulated information, the disease presumption means 13 extracts the new correlation with a medical practitioner's diagnostic result and the group of a patient's gene information and medical examination information, updates the correlation table 23 of the disease database 14, and the medical-examination support system of this invention uses it for a subsequent medical examination.

[0025] Drawing 6 is drawing showing the flow of the processing which extracts the information for disease presumption by this example. First, the disease presumption means 13 reads the accumulated gene information, medical examination information, and a diagnostic result (reading procedure 61). Next, the group of the conditions of gene information with a specific diagnostic result and strong correlation or medical examination information is extracted (condition extract procedure 62). The conditional expression of an if-then mold like the example of the relational expression 232 shown in drawing 2 (c) is sufficient as the group of this condition, and the formula which has numeric values, such as level of significance, in a solution is sufficient as it. The technique of data mining of looking for causal relation or a pattern etc. may be used for the extract of the group of the conditions of gene information with a specific diagnostic result and strong correlation, or medical examination information from data of a variety large quantity, such as a cluster analysis and discriminant analysis. Next, the extracted relational expression is displayed on the I/O means 15, and the input which chooses the relational expression judged that a medical practitioner can use for medical-examination exchange is received (I/O procedure 63). Next, the activity of a condition extract saves the relational expression which judged whether it was termination (termination decision procedure 64), and was chosen when it was termination on a correlation table (preservation procedure 65), and serves as extract termination.

[0026] By the above technique, out of the stored data, the electronic chart system of this invention extracts the new correlation of a patient's gene information, the combination of medical examination information, and a disease, and presupposes that the activity to presumption of a disease is possible for a medical practitioner with subsequent medical examination. Moreover, medically, by meaningless correlation, decision of a medical practitioner gets confused and only what was judged that a medical practitioner can use the extracted correlation for diagnostic exchange in a procedure 65 can be prevented, as it does not use for disease presumption.

[Translation done.]

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3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Drawing showing the example of the electronic chart structure of a system of the example of this invention.
[Drawing 2] Drawing showing the example of the data storage format in the example of this invention.
[Drawing 3] Drawing showing the flow of the processing at the time of a medical examination in the example of this invention.
[Drawing 4] Drawing showing the example of a screen display in the I/O means in the example of this invention.
[Drawing 5] Drawing explaining the detail of the example of a screen display in the I/O means in the example of this invention.
[Drawing 6] Drawing showing the flow of the processing which extracts the information for disease presumption in the example of this invention.
[Description of Notations]
11 -- A gene database, 12 -- A clinical recording database, 123 -- Medical-examination record table, 124 -- A diagnostic resulting table, 13 -- A disease presumption means, 14 -- Disease database, 15 -- An I/O means, 21 -- A gene information table, 211 -- Patient ID 212 [-- Medical examination information table,] -- Gene ID, 213 -- A gene name, 214 -- Gene variation, 22 221 -- Patient ID, 222 -- Item ID, 223 -- A subject name and as a result of 224 --, value, 23 [-- Level of significance,] -- A correlation table, 231 -- Correlation ID, 232 -- Relational expression, 233 234 [-- A disease and a syndrome name,] -- The number of examples, 24 -- A disease information table, 241 -- Disease ID, 242 243 [-- Reading procedure,] -- The guide of a diagnosis, 244 -- A required inspection, 245 -- A cure, 31 32 [-- Preservation procedure,] -- A disease presumption procedure, 33 -- An I/O procedure, 34 -- A termination decision procedure, 35 4 [-- Diagnostic support information change tab,] -- A display screen, 41 -- The name-of-patient column, 42 -- Medical-examination record, 43 44 [-- Presumed disease list,] -- The diagnostic support information column, 45 -- A termination carbon button, 51 -- A presumed disease tab, 511 512 -- The relational-expression column, 52 -- A medical examination information tab, 521 -- Medical examination information list, 53 [-- The disease name column, 542 / -- The subject name column, 543 / -- The contents column, 61 / -- A reading procedure, 62 / -- A condition extract procedure, 63 / -- An I/O procedure, 64 / -- A termination decision procedure, 65 / -- Preservation procedure.] -- A gene information tab, 531 -- A gene information list, 54 -- A disease information tab, 541

[Translation done.]

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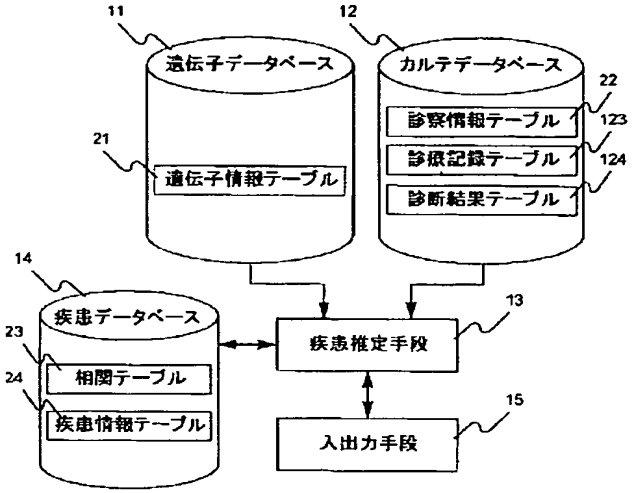
DRAWINGS

[Drawing 1]

図 1



[Drawing 2]

図 2

(a)

遺伝子情報テーブル 21

211 患者ID	212 遺伝子ID	213 遺伝子名	214 遺伝子変異
P00001	GR0001	RET	0
P00001	GA0027	APC	1
P00001	GA0334	ATM	0
P00001	GC1057	CDK4	0
…	…	…	…

(b)

診察情報テーブル 22

221 患者ID	222 項目ID	223 項目名	224 数量値
P00001	CQ1234	喫煙	0.6
P00001	CQ2345	飲酒	0.5
P00001	CQ3456	塩分	0.6
P00001	CQ4567	睡眠	0.3
…	…	…	…

(c)

相関テーブル 23

231 相関ID	232 関係式	233 危険率	234 事例数
R30203	if GR0001=1 and CQ4321<0.3 then DC3210	1.50	64
R30204	if GR0001=1 and CQ3332>0.8 then DC4321	1.73	32
R30205	if GR0001=1 and CQ3456>0.5 then DC5432	1.11	14
R30208	if GP0823=1 then DC6543	1.32	11
…	…	…	…

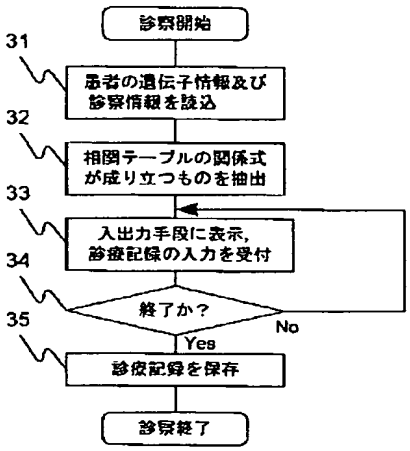
(d)

疾患情報テーブル 24

241 疾患ID	242 疾患名	243 診断の指針	244 必要な検査	245 合併症	…	246 治療法
DC3210	甲状腺髄様癌	○○○…	△△△…	×××…	…	□□□…
DC4321	大腸癌	…	…	…	…	…
DC5432	胃癌	…	…	…	…	…
DC6543	非ﾎｼﾞｷﾝﾘﾝﾊﾟ腫	…	…	…	…	…
…	…	…	…	…	…	…

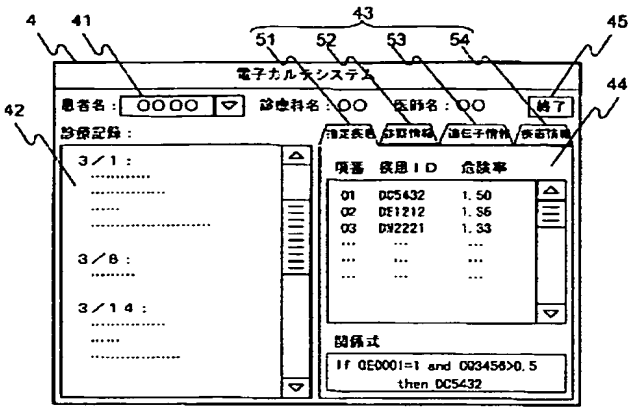
[Drawing 3]

図 3



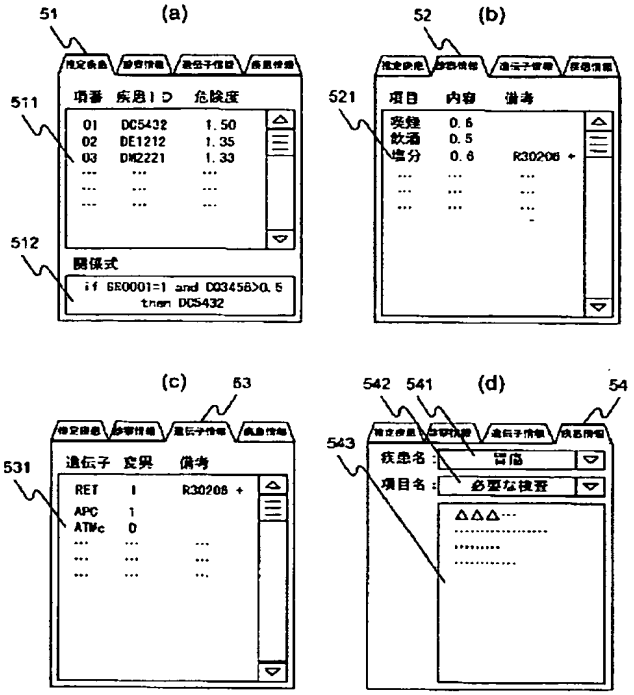
[Drawing 4]

図 4



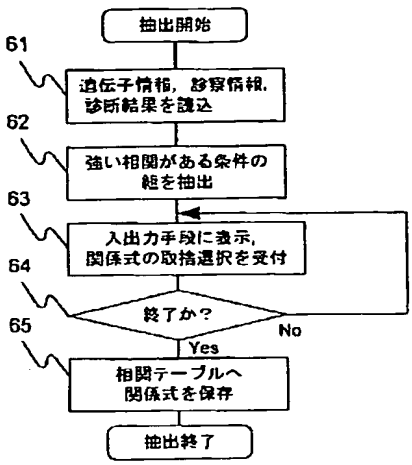
[Drawing 5]

図 5



[Drawing 6]

図 6



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